

BIOLOGICAL ASSESSMENT FOR THE CITRUS CANKER PROGRAM

(Broward, Collier, Dade, Hendry, Hillsborough, Manatee, and Palm Beach Counties, Florida)

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INTRODUCTION

The Animal and Plant Health Inspection Service (APHIS) is proposing a citrus canker eradication program (Program), in cooperation with the Florida Department of Agriculture and Consumer Services, for newly discovered infestations. The proposed Program combines a number of proven control methods with regulatory quarantines.

Citrus canker is a bacterial disease caused by *Xanthomonas axonopodis* pv. *citri* (Hasse) Dawson. It can cause extensive damage to twigs, leaves, and fruit of susceptible citrus varieties often causing fruit to drop prematurely and to be unmarketable due to lesions on the peel. The bacteria that cause citrus canker can survive for extensive periods on citrus branches and bark. The disease is spread by wind; rain splash; mechanical activities, such as pruning, picking, and spraying carried out within and between groves; movement of infected plants or plant parts; and the activities of birds, insects, and/or mammals. Citrus canker threatens the citrus growing areas of the United States because of its rapid spread, high potential for damage, and impact on exports to foreign countries and interstate movement.

The proposed Program will include the removal of infected trees and the treatment of stumps with trichlopyr. The trees and limbs will be burned or buried. For commercial groves, the burning or burning may be conducted on site or placed in a municipal landfill. For residential plantings, the removed plant material may be burned in municipal waste incinerators or placed in a municipal landfill. The herbicide trichlopyr will be applied directly to the stump by painting or spraying. It dries rapidly and is readily adsorbed by the stump. Environmental degradation occurs readily through photo degradation and microbial decomposition. Any trichlopyr that may reach the ground is not strongly adsorb to the soil particles, and it readily photo degrades. No run-off is anticipated (USDA/APHIS, 1999).

SPECIES ACCOUNTS

MAMMALS

Florida Panther (*Felis concolor coryi*)

Status: The Florida panther was listed as endangered on March 11, 1967 (USDOI, FWS, 1967).

Pertinent Species Information: The Florida panther is a medium-sized cat that is a subspecies of the more widespread *Felis concolor*. It is generally a solitary cat except during the breeding season (October to March). The gestation period is 90 to 95 days. The Florida panther ranges up to 310 square miles during a month. Its diet consists of rabbits, feral hogs, deer, and armadillos. The preferred habitat during the day is one that is heavily vegetated. At night, open areas that are good for hunting are preferred.

The present threats to the Florida panther are low population numbers, increased human presence, diseases and predation, and reduced prey base (FWS, 1987).

According to the FWS, the Florida panther occurs in the Program counties of Broward, Collier, Dade, Hendry, and Palm Beach.

Program Assessment: The Florida panther prefers remote habitats that contain heavy vegetation, such as swamp forests, hardwood hammock, and oak pine woodlands. These habitat types are not part of the Program area. Therefore, APHIS has determined that the Program will have no effect on the Florida panther.

West Indian (=Florida) Manatee (*Trichechus manatus*)

Status: The West Indian manatee was listed as endangered on March 11, 1967, and June 2, 1970 (USDOI, FWS, 1967, and USDOI, FWS, 1970a). Critical habitat has been designated (50 CFR Part 17.95(a)).

Pertinent Species Information: The West Indian manatee is a massive, fusiform, thick-skinned nearly hairless marine mammal with paddle-like forelimbs, no hindlimbs, and a spatulate, horizontally flattened tail.

Calving probably occurs throughout the year because small calves are seen every month. The female (cow) usually mates with several bulls during her brief period of receptivity. The gestation period is estimated to be 365 to 400 days. Manatees are known to eat many kinds of plants, preferring submergents to surface-floating and emergent vegetation.

The habitat of manatees consists of brackish waters, lagoons, and mouths of rivers. The species cannot tolerate water temperatures below 46 degrees, and movements

have been documented to warmer waters in Florida during cold periods. Turbidity seems to have no effect on the species, and animals can tolerate extremely muddy waters.

The manatee typically ranges from Beaufort, North Carolina, south to the Florida Keys and along the Gulf of Mexico (Burt and Grossenheider, 1964). In 1994, the species was detected as far north as in the Chesapeake Bay of Maryland. The entire State of Florida has been designated as a refuge and a sanctuary for the manatee, and federally designated critical habitat extended from Jacksonville on the Atlantic, along the coast in inland waterways, to Crystal River on the Gulf Coast (50 CFR Part 17.95 (a)).

The manatee was hunted extensively in the 18th and 19th Centuries. The present major threat to manatees is strikes by power boats (World Wildlife Fund, 1990).

According to the FWS, the West Indian manatee occurs in the Program counties of Broward, Collier, Dade, Hendry, Hillsborough, Manatee, and Palm Beach.

Program Assessment: The aquatic habitat of the manatee excludes it from being in close proximity to the Program area. Therefore, APHIS had determined that the Program will have no effect on the West Indian manatee or its critical habitat.

BIRDS

Audubon's Crested Caracara (*Polyborus plancus audubonii*)

Status: The Audubon crested caracara was listed as threatened on July 6, 1987 (USDOI, FWS, 1987c).

Pertinent Species Information: The Audubon crested caracara is a hawk of open country. Dry prairies with wetter areas and scattered cabbage palm constitute the typical habitat. Adults maintain large territories, usually with their mates. Pair bonds are strong, apparently lasting until one mate dies. The breeding peak is from January to March, and two to three eggs are laid in a nest made of slender vines and sticks, which is usually located in a cabbage palm. Incubation lasts about 32 days, and the young leave the nest at about 8 weeks of age. The family group usually remains together for 2 or 3 months after the young fledge.

Audubon crested caracaras are opportunistic feeders. Their diet consists of both carrion and living prey. The living prey is largely small turtles and turtle eggs, but it also eats insects, fish, frogs, lizards, snakes, birds, and small mammals.

Threats to the caracara are habitat loss due to conversion to citrus groves, tree

plantations, improved pastures, other agricultural uses, and real estate development. The current number of breeding birds is low relative to most other large raptors in Florida. The caracara is a long lived bird with a low reproductive rate that uses widely dispersed territories. It is susceptible to natural or human caused catastrophes, such as hurricanes and poisoning from pesticides (USDOI, FWS, 1987c).

According to the FWS, the Audubon crested caracara occurs in the Program counties of Broward, Collier, Hendry, Manatee, and Palm Beach.

Program Assessment: The Program area would not include the habitat of the caracara. Therefore, APHIS determined that the Program will have no effect on the Audubon crested caracara.

Bald Eagle (*Haliaeetus leucocephalus*)

Status: The bald eagle was listed as endangered throughout the lower 48 States on March 11, 1967 (USDOI, FWS, 1967). The species was reclassified as threatened in Washington, Oregon, Minnesota, Wisconsin, and Michigan on February 14, 1978 (USDOI, FWS, 1978b). A reclassification to threatened status in all of the lower 48 States was finalized July 12, 1995 (USDOI, FWS, 1995), and a proposal for delisting occurred on July 6, 1999 (USDOI, FWS, 1999).

Pertinent Species Information: Bald eagles are large raptors that mate for life. Breeding starts at age 4 to 5. They inhabit riparian habitats: rivers, coasts, and lakes. Bald eagles are opportunistic feeders eating a variety of living and dead (carrion) prey. The preferred diet is fish. Nesting sites are usually within 1 to 2 miles of water, in the largest living tree in a stand and with an open view of the surrounding area. Eagles are territorial during the breeding season, which begins in October; they defend an average territory size of 57 acres and establish a platform nest of sticks in a tall tree or cliff. A female bald eagle lays 2 eggs; incubation usually lasts 35 days. Ten to 12 weeks are needed for fledging. Nestlings usually fledge by mid-March; however, nesting activities sometimes carry on into June (FWS, 1989).

The decline of the bald eagle has been attributed to the use of DDT. DDT and its metabolites caused eggshell thinning, which lead to nesting failure (USDOI, FWS, 1995).

According to the FWS, the bald eagle occurs in the Program counties of Broward, Collier, Dade, Hendry, Hillsborough, Manatee, and Palm Beach.

Program Assessment: Impacts to the eagle would be those associated with disturbance during the breeding period. Nesting and fledging will be completed prior to Program implementation. Therefore, APHIS has determined that the Program will have no effect on the bald eagle.

Everglade Snail Kite (*Rostrhamus sociabilis plumbeus*)

Status: The Everglade snail kite was listed as endangered on March 11, 1967 (USDOI, FWS, 1967). Critical habitat was designated in 1977 (50 CFR Part 17.95 (b)).

Pertinent Species Information: The Everglade snail kite is a medium-sized hawk whose preferred habitat is extensive areas of shallow open surface water, such as sloughs and wet prairies, that retain some water throughout most years and usually for several successive years. These areas must have emergent vegetation to support populations of the apple snail. Such plant communities are normally situated in a larger marsh of sawgrass or cattails with only scattered shrubs, small trees, and tree islands. Flooding of marshes is necessary to sustain an adequate snail supply. The apple snail is the kite's primary food source. The kite has been observed eating rice rats, small turtles of several species, and two other aquatic snails. However, these are eaten when snail kites are unavailable or scarce.

Nesting occurs every month, but the main nesting season is January through August. Kites nest over water in trees or shrubs; cattails are used when trees and shrubs are not available. The clutch size is three and does not vary between years. Renesting can occur following the loss of a nest, plus there is double brooding when nesting occurs early in the season.

Threats to the Everglade snail kite started in the early 1900's and continues with the drainage of south Florida's wetlands for agricultural use and residential development. The increased demand for fresh water, the degradation of water quality, and the invasion of exotics, such as water hyacinth and Australian punktree, also is a continuing threat. Nesting success is comparatively low ranging from 0 to 10 percent when water levels are low to 50 percent when water levels are high (FWS, 1986a).

According to the FWS, the Everglade snail kite occurs in the Program counties of Broward, Collier, Dade, Hendry, and Palm Beach.

Program Assessment: The habitat of the kite would not be the same as the Program area. Therefore, APHIS has determined that the Program will have no effect on the Everglade snail kite or its critical habitat.

Piping Plover (*Charadrius melodus*)

Status: The piping plover was listed on December 11, 1985 (USDOI, FWS, 1985b). The listing designated the population breeding in the Great Lakes watershed as endangered and the populations breeding along the Atlantic Coast and in the northern Great Plains as threatened. Critical habitat has been proposed (USDOI, FWS, 2000).

Pertinent Species Information: Piping plovers are migratory shorebirds. They arrive in their northern breeding grounds in April or May and most leave the nesting grounds in

August. Four eggs are usually laid in the second or third week of May in a scrape in the sand, which is lined with pebbles or shell fragments. The breeding grounds are north of the Program; however, this species winters (from late July through early May) along the Gulf Coast (Texas to Florida) and eastern seaboard (from Georgia south). Their winter habitat is beaches and sandflats, from which they pick or probe marine worms, crustaceans, insects, and mollusks (Bent, 1962; FWS, 1988).

The threats to this species occur mostly on the breeding grounds, which include sandy beaches of the Atlantic (from North Carolina northward), inland areas around the Great Lakes, and potholes and rivers of the northern prairies. These habitats are highly disturbed by recreational activities, development, water projects, or natural phenomena that cause fluctuations in river or lake levels. However, coastal development throughout the range has undoubtedly negatively affected this species, as it is easily disturbed by humans and their pets (World Wildlife Fund, 1990).

According to the FWS, the piping plover occurs in the Program counties of Broward, Collier, Dade, Hillsborough, Manatee, and Palm Beach.

Program Assessment: The coastal habitat of the plover would not be the same as the Program area. Therefore, APHIS has determined that the Program will have no effect on the piping plover or its proposed critical habitat.

Florida Scrub Jay (*Aphelocoma coerulescens*)

Status: The Florida scrub jay was listed as threatened on June 3, 1987 (USDOl, FWS, 1987b).

Pertinent Species Information: The Florida scrub jay is a 12 inch bird that is restricted to scrub habitat areas of Florida that consists of dense thickets of scrub oaks less than 10 feet in height interspersed with bare sand for foraging and storing acorns. Such areas occur along the Atlantic coast, the dunes in Lake Wales Ridge, and in Ocala National Forest.

The Florida scrub jay eats about anything it can catch, but it concentrates on lizards and arthropods in spring and summer and acorns in fall and winter. Excess acorns are frequently cached in the ground. These birds are long-lived (about 10 years) and are monogamous. They nest from late February to early June. The raising of a brood is assisted by the older young, both males and females. Males assist for up to 7 years, whereas females assist the parents for about 2 years.

The major threat to the Florida scrub jay is habitat destruction. Other threats are shooting by vandals and road kills (USDOl, FWS, 1987b).

According to the FWS, the Florida scrub jay occurs in the Program counties of Collier, Hillsborough, Manatee, and Palm Beach.

Program Assessment: The habitat of the scrub jay is not the same as the Program area. Therefore, APHIS determined that the Program will have no effect on the Florida scrub jay.

Cape Sable Seaside Sparrow (*Ammodramus maritimus mirabilis*)

Status: The Cape Sable seaside sparrow was listed as endangered on March 11, 1967 (USDOI, FWS, 1967). Critical habitat has been designated (50 CFR 17.95(b)).

Pertinent Species Information: The Cape Sable seaside sparrow is a medium sized, non-migratory sparrow that lives in freshwater and brackish marshes and flooded prairies. It eats soft-bodied insects (grasshoppers, spiders, moths, caterpillars, beetles, dragonflies, wasps), marine worms, shrimp grass, and sedge seeds.

Breeding can take place from late February to early August with one or two and possibly three broods a season if weather conditions allow. A cup nest is built about 5 inches off the ground in grasses. Three to 4 eggs are laid, incubation take 12 to 13 days, and the young spend 9 to 11 days in the nest. Both parents rear and feed the young.

Threats to the sparrow include the invasion of native and exotic trees, hydrologic changes, and predations from raccoons, snakes, rice rats, and hawks (FWS, 1999).

According to the FWS, the Cape Sable seaside sparrow occurs in the Program counties of Broward, Collier, and Dade.

Program Assessment: The scrub habitat of the sparrow would not be included in the Program area. Therefore, APHIS has determined that the Program will have no effect on the Cape Sable seaside sparrow or its critical habitat.

Wood Stork (*Mysteria americana*)

Status: The wood stork was listed as endangered on February 28, 1984 (USDOI, FWS, 1984a).

Pertinent Species Information: The wood stork is a large, long-legged wading bird with a white body; a gray, naked head; and a dark, thick bill (USDOI, FWS, 1984a). The wood stork builds a platform nest of large sticks lined with leaves in the tops of cypress trees. Storks are very colonial, with 5 to 25 nests per tree. They lay two to five eggs and fledge two young in a year of abundant prey (Ehrlich, et al., 1988). Their diet consists of small fish, such as topminnows and sunfish. The stork requires a high concentration of prey. It probes the water with its beak partially open, and if a fish touches it, the bill reflexively snaps shut.

The stork prefers fresh water, brackish wetlands, and cypress and mangrove swamps.

Depressions in these marshes, where fish become concentrated in dry periods, are the preferred feeding areas. The wood stork often ranges as far as 80 miles from nesting to feeding areas. Breeding populations of the species are presently restricted to Florida, Georgia, and marginally South Carolina.

Reproductive failures are primarily from feeding problems caused by water management in south Florida. Water levels in these swamps remain too high for the stork to feed properly. Nest failures have even been reported in protected areas, such as the Everglades (FWS, 1986b).

According to the FWS, the wood stork occurs in the Program counties of Broward, Collier, Dade, Hendry, Hillsborough, Manatee, and Palm Beach.

Program Assessment: The nesting areas of the wood stork would not be included in the Program area. However, the feeding areas, up to 80 miles from the nesting areas, could be near the Program area. The cutting of citrus trees would have no effect on the stork and the treating of stumps is not expected to create any run-off of the chemical. Therefore, APHIS has determined that the Program will have no effect on the wood stork.

Roseate Tern (*Sterna dougallii*)

Status: The northeast population of the roseate tern was listed as endangered, and the Caribbean population was listed as threatened on November 2, 1987 (USDOI, FWS, 1987d).

Pertinent Species Information: The roseate tern is a dove-sized (about 15 inches long) coastal bird that feeds mainly on small schooling marine fish, which it captures by plunging headfirst into the water (USDOI, FWS, 1987d). The terns that nest in the northeastern United States winter from western Columbia to eastern Brazil. Most of the Caribbean birds probably winter further to the south (FWS, 1999). The birds migrate into Florida in late April or early May.

Nests are built on the ground on isolated islands, rubble islets, and dredge-spoil. Some roseate terns have nested on roof tops. A few terns will nest at age 2, but the usual age is 3 to 4. Eggs are laid in May with downy chicks hatching in June. The clutch size for the Caribbean population is between 1.31 to 1.71 eggs per nest. Both sexes incubate, brood, and feed the young (FWS, 1999).

The nesting populations in North America and the Caribbean are very small and localized and occur only along marine coasts. Abandonment of nesting sites is due to predation by nocturnal-feeding mammals and competition with gulls for nesting space. Threats to the roseate tern include habitat loss and modification, predation and competition (USDOI, FWS, 1987d), and human interference during nesting (FWS, 1999).

According to the FWS, the roseate tern occurs in the Program counties of Broward,

Dade, and Palm Beach.

Program Assessment: The Program area will not include the coastal habitat of the tern. Therefore, APHIS has determined that the Program will have no effect on the roseate tern.

Bachman's (Wood) Warbler (*Vermivora bachmani*)

Status: The Bachman's warbler was listed as endangered on March 11, 1967 and June 2, 1970 (USDOI, FWS, 1967, and USDOI, FWS, 1970a).

Pertinent Species Information: The Bachman's warbler is a small migratory songbird that winters in Cuba and the Isle of Pines and migrates to the Southeast United States in mid-March to breed. Breeding has been documented in Alabama, Arkansas, Kentucky, Missouri, Oklahoma, and South Carolina. It does not breed in Florida but transits through during migration. The habitat requirements during migration are variable, but floodplain forests are an important habitat. The habitat requirements for nesting warblers is typically low, wet, forested areas containing variable amounts of water but usually some permanent water. The warbler builds a cup-shaped nest near the ground out of dried leaves, weeds, and grass stalks and lines it with Spanish moss. The clutch size is thought to be three to four eggs. Evidence suggests that the species is particularly adapted to swampy canebreaks or bamboo thickets. This warbler forages in dense foliage high in trees and an insect diet, similar to other *Vermivora*, is suspected.

The last sighting of the Bachman's warbler in Florida was reported in 1977 near Melbourne. The last confirmed sighting in the United States was in Louisiana in 1988. The last sighting in Cuba was in 1981. The species was hunted for its feathers, and its decline also may be tied to the decrease in the canebreak habitat. Much of this habitat has been cleared for agriculture (FWS, 1999).

According to the FWS, the Bachman's warbler could occur in the Program counties of Broward, Collier, Dade, Hendry, and Palm Beach.

Program Assessment: Since there have been no recent sightings of this bird in the United States, APHIS determined that the Program will have no effect on the Bachman's warbler.

Kirtland's Warbler (=Wood) (*Dendroica kirtlandii*)

Status: The Kirtland's warbler was listed as endangered on March 11, 1967 and June 2, 1970 (USDOI, FWS, 1967 and USDOI, FWS, 1970a).

Pertinent Species Information: The Kirtland's warbler is a small songbird, approximately 5 to 7 inches, whose primary diet consists of insects (moths, caterpillars, adult ant lions, and numerous insects), but it does feed on tree sap and blueberries. It

is a migratory bird that is present in Michigan from April to August/September at which time it nests. It builds a typical cup nest in the soil and lays 4 to 5 eggs in June that incubate 26 to 28 days. Nesting occurs in central Michigan in the Au Sable River watershed in Crawford, Oscoda, and Ogemaw Counties. The habitat requirements for nesting are distinctive. They require Jack pines at least 7 feet tall and up to 20 feet tall with low ground cover. This habitat type was achieved when forest fires were not minimized. When the Jack pines grow larger than 16 to 20 feet tall with no lower branches, the warbler will not nest in the area. A tract must be at least 80 acres and preferably 200+ acres to attract the warbler. Another specific nesting habitat requirement is the presence of Grayling sand, which quickly drains during summer downpours and prevents nest flooding. The Kirtland's warbler migrates through Florida on its way to and from its wintering habitat in the Bahama Islands, other Caribbean Islands (Grand Turks and Caicos Islands and the Dominican Republic), and maybe Cuba. The wintering habitat requirements are not well known, but from January through April it is associated with desert-like vegetation of deciduous shrubs and Caribbean pine ecosystem.

The major threats to the Kirtland's warbler are habitat destruction and nest parasitism by brown-headed cowbirds (*Molothrus ater*) (FWS, 1991; FWS, 1976).

According to the FWS, the Kirtland's warbler occurs in the Program counties of Broward, Dade, and Palm Beach.

Program Assessment: The warbler is present in the Program area for a short period of time as it migrates through in the fall and spring. Therefore, APHIS has determined that the Program will have no effect on the Kirtland's warbler.

Ivory-billed Woodpecker (*Campephilus principalis*)

Status: The ivory-billed woodpecker was listed as endangered on March 11, 1967, and June 2, 1970 (USDOI, FWS, 1967, and USDOI, FWS, 1970a).

Pertinent Species Information: The ivory-billed woodpecker is the largest North American woodpecker reaching a length of 19.5 inches. It excavates a cavity in trees about 30 feet off the ground for nesting (World Wildlife Fund, 1990), which occurs from January to May (FWS, 1991). A clutch of 2 to 3 eggs are incubated for about 20 days. Young fledge in about 35 days. This woodpecker forages on the larvae of engraver beetles that live just under the bark of dead or dying trees (World Wildlife Fund, 1990). Fruits, nuts, and seed are also occasionally eaten (FWS, 1991).

The ivory-billed woodpecker requires large tracts of forest to survive - up to 2,000 acres for each pair. It inhabits bottomland, cypress swamps, and uncut long-leaf pine forests. The last confirmed observation in the United States was in Louisiana on the Tensas River National Wildlife Refuge. A survey was recently conducted to search for this woodpecker and, no birds were located. Areas that may still have habitat for the ivory-billed woodpeckers include: the Atchafalaya Basin (Louisiana), the Santee River (South Carolina), the Altamaha River (Georgia), the Yazoo and Pascagoula Rivers

(Mississippi), and the Suwannee, Withlacoochee, and Ochloconee Rivers (Florida). It was observed in Cuba in 1986. Two additional expeditions, 1991 and 1993, took place with no ivory-billed woodpeckers observed (Lammertink, 1995).

Threats to the species are from logging and over hunting of the adults (World Wildlife Fund, 1990).

According to the FWS, the ivory-billed woodpecker could occur in the Program counties of Broward, Collier, Dade, Hendry, and Palm Beach.

Program Assessment: Due to the forest habitat of this bird and since there have been no recent sightings of this woodpecker in the United States, APHIS determined that the Program will have no effect on the ivory-billed woodpecker.

Red-cockaded Woodpecker (*Picoides (=Dendrocopos) borealis*)

Status: The red-cockaded woodpecker was listed as endangered on October 13, 1970 (USDOJ, FWS, 1970b).

Pertinent Species Information: The red-cockaded woodpecker is a small bird about 7 to 8 inches long. This woodpecker excavates nest cavities in living pine trees, sometimes infected by redheart disease. These birds are strongly territorial and live in a family unit, or clan, of 5 to 10 birds, consisting of a breeding pair and unmated young. Nesting occurs in April and May, with a clutch size of two to five eggs. Incubation lasts about 10 days, and juveniles remain in the parents' home range through the summer and into the fall. The red-cockaded woodpecker is a habitat specialist, nesting in open stands of pines a minimum of 60 years old. They keep numerous small "wells" of sap running around the entrance to the cavity as a defense mechanism against nest predators, such as snakes. They feed on surface and subsurface arthropods. A colony requires an average of 200 acres.

Loss of old-growth stands of long-leaf and loblolly pine to logging, development, and improper management are major threats to the red-cockaded woodpecker (World Wildlife Fund, 1990).

According to FWS, the red-cockaded woodpecker occurs in the Program counties of Broward, Collier, Hendry, Hillsborough, Manatee, and Palm Beach.

Program Assessment: The forested habitat of the woodpecker is not the habitat included in the Program area. Therefore, APHIS has determined that the Program will have no effect on the red-cockaded woodpecker.

REPTILES

American Crocodile (*Crocodylus acutus*)

Status: The American crocodile was listed as endangered on September 25, 1975 (USDOI, FWS, 1975). Critical habitat has been designated (50 CFR 17.95(c)).

Pertinent Species Information: The American crocodile is a reptile that lives in the coastal mangrove swamps, salt and brackish bays, and brackish creeks of southern Florida. The adults eat fish, crabs, birds, turtles, snakes, and small mammals. The young feed chiefly on aquatic invertebrates and small fish. The crocodile breeds in the southern portion of the Everglades National Park, chiefly in Florida Bay, and outside the park at Key Largo and Turkey Point. Nest construction occurs in April, 20 to 60 eggs are laid in late April to early May, and hatching occurs from July to August. Nesting occurs in hardwood thickets at the head of small sand beaches and banks along narrow coastal creeks (FWS, 1991). Crocodiles are active and forage from shortly before sunset to shortly after sunrise (FWS, 1999).

Threats to the crocodile include loss of habitat to urbanization, human disturbance, intentional killing (FWS, 1991), including hunting for hides (FWS, 1999), accidental deaths from commercial fishing nets and highway collisions, predation of eggs by raccoons, and a decrease in the amount of freshwater available to the hatchlings that cannot tolerate as much salinity as adults (FWS, 1991).

According to the FWS, the American crocodile occurs in the Program counties of Collier and Dade.

Program Assessment: The coastal habitat of the crocodile will not be included in the Program area. Therefore, APHIS has determined that the Program will have no effect on the American crocodile or its critical habitat.

Sea Turtles

The following five sea turtles are all marine organisms, except when nesting on beaches. The potential impacts due to Program activities are the same for all five species. For this reason, the Program assessment for the green sea turtle, the hawksbill sea turtle, the Kemp's ridley sea turtle, the leatherback sea turtle, and the loggerhead sea turtle has been combined and follows the species accounts of the five sea turtles.

Green Sea Turtle (*Chelonia mydas*)

Status: The green sea turtle was listed as endangered on July 28, 1978, (USDOI, FWS, 1978c).

Pertinent Species Information: Green sea turtles spend most of their lives feeding on sea grasses and algae along the Continental Shelf. They migrate long distances and return to the same beaches at intervals of 2 to 4 years to nest. In the United States, the green sea turtles nest from June through August. Nesting occurs in North Carolina,

Georgia, and Florida. Nesting beaches need to be relatively undisturbed by humans and predators, and they must have stable temperatures and moisture for the 48 to 70 days of incubation. The females crawl ashore at night and lay 100 to 200 eggs.

The threats to the green sea turtle include development of beaches, hunting for their meat, poaching of the eggs, and drowning as a result of being caught in shrimp nets. The State of Florida is working to preserve the nesting areas, and the National Marine Fisheries Service has regulations (50 CFR Part 227) requiring the use of turtle excluder devices (TED's) on larger shrimp boats in both the Atlantic and the Gulf of Mexico (World Wildlife Fund, 1990).

According to the FWS, the green sea turtle occurs in the Program counties of Broward, Collier, Dade, Hillsborough, Manatee, and Palm Beach.

Hawksbill Sea Turtle (*Eretmochelys imbricata*)

Status: The hawksbill sea turtle was listed as endangered on June 2, 1970 (USDOI, FWS, 1970a). Critical habitat has been designated in Puerto Rico (50 CFR 17.95(c) and 226.71).

Pertinent Species Information: The hawksbill is one of the smaller of the sea turtles. Mature turtles grow to a length of 2 feet and weigh 100 pounds. The name "hawksbill" is derived from the turtle's prominent hooked beak.

The hawksbill sea turtle is primarily carnivorous feeding on jellyfish, sponges, and other sedentary organisms near coral reefs. The species does not migrate and occupies a small range. In tropical waters, the turtle breeds year-round, and the species tends to nest alone. The female will scoop out a nest in an isolated, undisturbed, sandy beach area and deposit about 160 eggs, which incubate in about 50 days.

Currently found throughout the world in tropical seas, the hawksbill sea turtle represents two distinct subspecies in the Atlantic and Indo-Pacific. No population estimates exist. The hawksbill is pelagic and spends most of its time in the open ocean (World Wildlife Fund, 1990).

According to the FWS, the hawksbill sea turtle occurs in the Program counties of Broward, Collier, Dade, and Palm Beach.

Kemp's (=Atlantic) Ridley Sea Turtle (*Lepidochelys kempii*)

Status: The Kemp's ridley sea turtle was listed as endangered on June 2, 1970, (USDOI, FWS, 1970a).

Pertinent species information: Although the Kemp's ridley sea turtle may reach 70 to 100 pounds in weight, it is the smallest member of the sea turtle family Cheloniidae. The species is a migratory species inhabiting the open waters for much of the year

before returning to land for the nesting season. The species has a high reproductive potential, and each nesting female may lay about 100 eggs during multiple nestings during a year.

Kemp's ridley sea turtles nest on rock-strewn beaches where primary vegetation grows along the berm and dunes are vegetated with a climax community of shrubs and small trees. Almost the entire nesting population of these turtles is found in the Playo del Rancho Nuevo, in the State of Tamaulipas, Mexico. A few nestings were recorded on Padre Island, Texas, but such sightings are rare. The species' primary sea habitat is

the Gulf of Mexico, but juveniles have been found along the eastern coast of the United States from Florida to Cape Cod. The Kemp's ridley sea turtle is primarily carnivorous, and its favorite food is the blue crab.

The factors affecting the decline of this sea turtle are predation, poaching, and drowning caused by entanglement in shrimp nets. The nesting beach in Mexico is now protected by patrols to prevent poaching, and the eggs are moved to predator-proof hatcheries. The use of TED's (50 CFR Part 227) in both the Atlantic and the Gulf of Mexico will have a positive effect on the Kemp's ridley sea turtle (World Wildlife Fund, 1990).

According to the FWS, the Kemp's ridley sea turtle occurs in the Program counties of Broward, Collier, Dade, and Palm Beach.

Leatherback Sea Turtle (*Dermochelys coriacea*)

Status: The leatherback sea turtle was listed as endangered on June 2, 1970 (USDOI, FWS, 1970a). Critical habitat has been designated in the Virgin Islands (50 CFR 17.95(c) and 226.71).

Pertinent Species Information: The leatherback sea turtle is the largest sea turtle in the world and is known to migrate great distances. It spends most of its adult life in the

open ocean, entering shallow waters only at breeding time. It eats twice its body weight of jellyfish each day with supplements of soft-bodied creatures.

The United States nesting beaches include barrier islands in south central Florida from Vero Beach to Boca Raton. The other nesting area is on St. Croix in the U.S. Virgin Islands. Nesting begins in March and continues until July. The females come ashore at night and lay about 35 eggs. The eggs incubate approximately 60 days before hatching.

The major threats to the leatherback sea turtle include destruction of nesting beaches; hunting for food and oil; swallowing plastic bags, which resemble jellyfish; and drowning when caught in shrimp nets. The use of TED's (50 CFR Part 227) and the preservation

of nesting beaches will help conserve the species (World Wildlife Fund, 1990).

According to the FWS, the leatherback sea turtle occurs in the Program counties of Broward, Collier, Dade, and, Palm Beach.

Loggerhead Sea Turtle (*Caretta caretta*)

Status: The loggerhead sea turtle was listed as threatened on July 28, 1978 (USDOI, FWS, 1978c).

Pertinent Species Information: The loggerhead sea turtle is carnivorous and has strong jaws to crush heavy-shelled mollusks and crustaceans. From May to August adult females lay an average of two clutches of eggs at 13-day intervals. Each clutch size is approximately 120 eggs. The eggs incubate for 2 months, with the hatchlings emerging, usually at night, and making their way to the ocean. The females require well-drained dunes, clean sand, and grassy vegetation for nesting.

The factors affecting the decline of the loggerhead sea turtle are habitat destruction, predation, and drowning from being caught in shrimp nets. The States of North Carolina, South Carolina, Georgia, and Florida are taking steps to prevent beach destruction and predation, and the Atlantic and Gulf shrimpers are using TED's (50 CFR Part 227) to prevent drowning (World Wildlife Fund, 1990).

According to the FWS, the loggerhead sea turtle occurs in the Program counties of Broward, Collier, Dade, and Palm Beach.

Program Assessment: The beach habitat of the sea turtle when nesting is not the habitat included in the Program area. Therefore, APHIS has determined that the Program will have no effect on the green sea turtle, the hawksbill sea turtle, the Kemp's ridley sea turtle, the leatherback sea turtle, or the loggerhead sea turtle. Critical habitat is not within the Program area.

Atlantic Salt Marsh Snake (*Nerodia fasciata taeniata*)

Status: The Atlantic salt marsh snake was listed as threatened on November 29, 1977 (USDOI, FWS, 1977).

Pertinent Species Information: The Atlantic salt marsh snake is a small, slender snake that inhabits coastal salt marshes and mangrove swamps that vary in salinity from brackish to full strength seawater. When they are in the brackish tidal marshes, they are most often found in association with saltwort flats and salt grass-bordered tidal

creeks. They can be active at any time, and the activity is strongly influenced by tidal cycles and availability of food. This snake feeds primarily on small fish, but it will eat frogs when available. They are ovoviviparous (eggs hatch within the female's body) and give birth to 3 to 9 young between August and October.

The snake is threatened by habitat loss and alterations due to intensive drainage and development plus the potential hybridization with adjacent freshwater snakes (FWS, 1999).

According to the FWS, the Atlantic salt marsh snake occurs in the Program county of Palm Beach.

Program Assessment: The aquatic habitat of the snake is not included in the Program area. Therefore, APHIS has determined that the Program will have no effect on the Atlantic salt marsh snake.

Eastern Indigo Snake (*Drymarchon corais couperi*)

Status: The eastern indigo snake was listed as threatened on January 31, 1978 (USDOI, FWS, 1978a).

Pertinent Species Information: The eastern indigo snake attains a length of approximately 8 feet and has a lustrous black body. It has a wide diet, which includes fish, frogs, toads, snakes, lizards, turtles, turtle eggs, small alligators, birds, and small mammals. The snake is not territorial and may cover a wide range, depending on the season. During the winter (December through April), the species inhabits a range of about 19.5 acres; in the spring and summer its range increases to an average of 225.8 acres by late summer (FWS, 1982).

The snake often takes refuge in the abandoned summer nesting burrows of the gopher tortoise (*Gopherus polyphemus*) when that species moves to its winter habitat. This habitat tends to be characterized by dry, sandy ridges. The loss of habitat through increased urbanization and agricultural development has contributed to the population decline of the eastern indigo snake. Habitat fragmentation has isolated snake populations and increased highway mortality. The decline of the gopher tortoise, also a threatened species, has reduced the area of the snake's potential habitat by decreasing the number of sandy ridge burrows available for winter refuge (World Wildlife Fund, 1990).

According to the FWS, the eastern indigo snake occurs in the Program counties of Broward, Collier, Dade, Hendry, Hillsborough, Manatee, and Palm Beach.

Program Assessment: The eastern indigo snake could occur throughout the Program

area. However, the cutting of trees and the treating of stumps should have no direct or indirect effects on the snake. Therefore, APHIS has determined that the Program will have no effect on the eastern indigo snake.

FISH

Gulf Sturgeon (*Acipenser oxyrinchus desotoi*)

Status: The Gulf sturgeon was listed as a threatened species on September 30, 1991 (USDOI, FWS, 1991).

Pertinent Species Information: The Gulf sturgeon is a large nearly cylindrical subspecies of the Atlantic sturgeon (*A. oxyrinchus*). It is a bottom-feeding species that primarily eats invertebrates, including brachiopods, insect larvae, mollusks, worms, and crustaceans. Most adult feeding occurs in the Gulf of Mexico and its estuaries. As an anadromous species, however, reproduction occurs in freshwater in February with individuals probably breeding in the same river system in which they hatched. Spawning occurs in areas of deep water with clean rock gravel or sand bottoms. The Gulf sturgeon is a slow-maturing, long-lived fish; females require 8 to 12 years to reach sexual maturity, while males need 7 to 10 years.

The present range of the Gulf sturgeon is primarily found along the Florida coast. The Suwannee River contains the healthiest remaining population of Gulf sturgeon, but the species also has been identified in Lake Pontchartrain, Louisiana; the Mobile River system in Alabama; and the Pascagoula and Pearl Rivers in Mississippi. This species inhabits large freshwater rivers from late winter through fall, is only transitory in coastal waters, and spends the winter in offshore marine waters.

The primary factor in the decline of the Gulf sturgeon has been the impoundment of the major rivers and their tributaries that restrict upstream migration and destroys spawning habitat. Dredging, desnagging, and the deposit of dredging spoils conducted for channel improvement and maintenance also may degrade the species' preferred spawning habitat (World Wildlife Fund, 1990).

According to the FWS, the Gulf sturgeon occurs in the Program counties of Hillsborough and Manatee.

Program Assessment: No run-off from stump treatments is anticipated. Thus, the habitat of the sturgeon will not be affected. Therefore, APHIS has determined that the Program will have no effect on the Gulf sturgeon.

INSECTS

Schaus Swallowtail Butterfly (*Heraclides (=Papilio) aristodemus ponceanus*)

Status: The Schaus swallowtail butterfly was listed as threatened on April 28, 1976 (USDOI, FWS, 1976). It was reclassified as endangered on August 31, 1984 (USDOI, FWS, 1984b).

Pertinent Species Information: The Schaus swallowtail butterfly lives in subtropical dry forests (hardwood hammocks) in southern Miami-Dade County through the Keys. Adults feed on the nectar from blossoms of guava, wild tamarind, and cheese shrub. Larvae feed on the tender new growth of torchwood and wild lime (FWS, 1991). Adults prefer shady habitat for feeding and oviposition, while the larvae are more commonly found on host plants that grow in open areas.

Schaus swallowtails have a single annual flight season, primarily in May and June, where adults are active (FWS, 1999). Most reproduction is correlated with the beginning of the rainy season, April to June. This seems to trigger the emergence of adults. Eggs are deposited on the top of torchwood and wild lime, where the plants are not in open sunlight (FWS, 1999). Eggs hatch in 3 to 5 days and at the age of 20 days the larvae enter their last (fourth) molt. The pupal stage remains dormant for 1 to 2 years. Adults live for about 1 month (FWS, 1991).

Threats to the butterfly are habitat loss, aerial application of insecticides, over-collecting (FWS, 1996), and extreme climactic conditions, such as hurricanes, freezes, and droughts (FWS, 1991).

According to the FWS, the butterfly occurs in the Program county of Dade.

Program Assessment: The habitat of the butterfly will not be included in the Program area. Therefore, APHIS has determined that the Program will have no effect on the Schaus Swallowtail butterfly.

PLANTS

Florida Golden Aster (*Chrysopsis (=Heterotheca) floridana*)

Status: The Florida golden aster was listed as endangered on May 16, 1986 (USDOI, FWS, 1986a).

Pertinent Species Information: The Florida golden aster is a perennial herb that occurs in sand pine and oak scrub or in disturbed areas at the edge of scrub habitat. It

flowers in late November and December and sheds seed from December onward. It can spread vegetatively, but reproduction is primarily by seed. Seedling emergence is enhanced by disturbances, such as rooting by armadillos or the presence of an ant mound. The disturbed soil of a gopher tortoise burrow also provides suitable soil for germination. The aster has been reintroduced into several locations.

Threats to the Florida golden aster include residential and commercial development, mowing, intense grazing, and off-road vehicles (ORV's) (FWS, 1999).

According to the FWS, the Florida golden aster occurs in the Program county of Hillsborough. The Multi-Species Recovery Plan for South Florida includes Manatee County as a county of occurrence (FWS, 1999).

Program Assessment: The scrub habitat of the aster will not be included in the Program area. Therefore, APHIS has determined that the Program will have no effect on the Florida golden aster.

Florida Perforate Cladonia (*Cladonia perforata*)

Status: The Florida perforate cladonia was listed as endangered on April 27, 1993 (USDOI, FWS, 1993a).

Pertinent Species Information: The Florida perforate cladonia is a lichen that occurs in high, well-drained sands of rosemary scrub. They typically occur in open patches of sand between shrubs in areas with sparse or no herbaceous cover. They form mats that can be composed of only Florida perforate cladonia or a mixture with other species of *Cladonia* or *Cladina*. The branches are developmentally derived from spore-producing structures rather than from the vegetative body of the lichen. It is suspected that this lichen reproduces only by vegetative fragmentation; no spore-producing organs have been described.

Threats to the cladonia include loss of scrub habitat, trampling, ORV's, hurricane washover, and improper land management (FWS, 1999).

According to the FWS, the Florida perforate cladonia occurs in the Program county of Palm Beach. The Multi-Species Recovery Plan for South Florida includes Manatee County as a county of occurrence (FWS, 1999).

Program Assessment: The scrub habitat of the cladonia will not be included in the Program area. Therefore, APHIS has determined that the Program will have no effect on the Florida perforate cladonia.

Okeechobee Gourd (*Cucurbita okeechobeensis* ssp. *okeechobeensis*)

Status: The Okeechobee gourd was listed as endangered on July 12, 1993 (USDOI, FWS, 1993b).

Pertinent Species Information: The Okeechobee gourd is an annual or perennial vine that will climb any plant that provides a trellis. The plants that are most closely associated with the gourd are elderberry and buttonbush. Around Lake Okeechobee, the gourd is frequently associated with alligator nests. These disturbed sites provide elevated areas and the preferred support plants.

Seeds germinate in early spring during the dry season. The plant then produces flowers in the spring, and fruits, which are gourds, are most visible by early to mid-summer. Based upon closely related gourds, the pollinators of the Okeechobee gourd could include bees, flies, and squash beetles. Marsh rabbits may be the main terrestrial dispersal agent. It also is suggested that the gourds are dispersed by floating in canals.

Threats to the Okeechobee gourd include the conversion of swamp forests to agriculture, prolonged changes in the water level, the introduction of the exotics, such as *Melaleuca* and the Australian pine, and the use of herbicides for vegetation management (FWS, 1999).

According to the FWS, the Okeechobee gourd occurs in the Program county of Palm Beach.

Program Assessment: The swamp habitat of the gourd will not be part of the Program area. Therefore, APHIS has determined that the Program will have no effect on the Okeechobee gourd.

Beach Jacquemontia (*Jacquemontia reclinata*)

Status: The beach jacquemontia was listed as endangered on November 24, 1993 (USDOI, FWS, 1993c).

Pertinent Species Information: The beach jacquemontia is a perennial vine that requires open areas typically found on the crest and lee sides of stable dunes. It also invades and restabilizes maritime hammocks or coastal strand communities that have been disturbed. It flowers from November to May and can propagate vegetatively at any time. Fruit sets are produced at some sites and seed dispersal is prolific. Possible pollinators are from the Halictidae family.

Threats to the jacquemontia include habitat conversion for residential and commercial construction, having a limited geographic distribution, the fragmentation of the remaining habitat, beach erosion, the small sizes of the populations, and natural events (FWS, 1999).

According to the FWS, the beach jacquemontia occurs in the Program counties of Broward, Dade, and Palm Beach.

Program Assessment: The coastal habitat of the jacquemontia is not included in the Program area. Therefore, APHIS has determined that the Program will have no effect on the beach jacquemontia.

Crenulate Lead-plant (*Amorpha crenulata*)

Status: The crenulate lead-plant was listed as endangered on July 18, 1985 (USDOI, FWS, 1985a).

Pertinent Species Information: The crenulate lead-plant is a perennial shrub that inhabits poorly-drained Opalocka Sands within pine rocklands, wet prairies with Opalocka-rock Outcrop Complex soils, seasonally hydrated soils, including wet pinelands, traverse glades, and hammock edges. These habitats are maintained by frequent burning. It is a rhizomatic plant that flowers in the spring, and it is semi deciduous with approximately 70 percent of the plants losing most or all of their leaves from December to February. This shrub can reach 5 feet in height and can grow in areas of open sun to partial shade. It has been introduced into the Cutler area.

Threats to the lead-plant are habitat loss, fire suppression, drainage, and exotic plant invasions from Brazilian pepper, *Schinus terebinthifolius*, and a large reed (*Neyraudia* sp.) (FWS, 1999).

According to the FWS, the crenulate lead plant occurs in the Program county of Dade.

Program Assessment: The habitats of the lead-plant would not be those included in the Program area. Therefore, APHIS has determined that the Program will have no effect on the crenulate lead-plant.

Small's Milkpea (*Galactia smallii*)

Status: The Small's milkpea was listed as endangered on July 18, 1985 (USDOI, FWS, 1985a).

Pertinent Species Information: The Small's milkpea is a perennial legume with small purple flowers that may bloom throughout the year a few weeks after a burn. Normal flowering occurs during the summer months. The habitat of the milkpea is pine rocklands. Several pollinators have been identified, three species of bees (one is a carpenter bee), one species of wasp, and the Cassius blue butterfly.

Threats to the species include habitat loss due to conversion to housing, commercial construction, or agriculture; fragmentation of habitat; fire suppression; and invasion by

exotics, such as Brazilian pepper and the reed *Neyraudia reynaudiana* (FWS, 1999).

According to the FWS, the Small's milkpea occurs in the Program county of Dade.

Program Assessment: The habitat of the milkpea will not be included in the Program area. Therefore, APHIS has determined that the Program will have no effect on the Small's milkpea.

Four-petal Pawpaw (*Asimina tetramera*)

Status: The four-petal pawpaw was listed as endangered on September 26, 1986 (USDOI, FWS, 1986b).

Pertinent Species Information: The four-petal pawpaw is a shrub that reaches a height of from 3 to over 9 feet. It grows in sand pine scrub habitat on old coastal dunes that are excessively drained. This shrub is deciduous, or partly so, with new leaves emerging in April and continuing to develop into the summer. Flowering occurs throughout the summer but peaks in April and May. Pollinators are most likely beetles with Dipterans, Hymenopterans, and other insects having been observed visiting the flowers. Seed dispersal may be from gopher tortoises and small mammals (Florida mouse) that eat the fleshy fruit. Ingestion of the seeds are not necessary for germination, which occurs from September to March, and can take 1 to 8 months. The pawpaw is adapted to infrequent, intense fires that occur every 20 to 80 years. The abundance of flowers and fruitsets decreases as the canopy closes over the shrub.

Threats to the pawpaw come from habitat loss due to its conversion to residential housing and commercial activities (FWS, 1999).

According to the FWS, the four-petal pawpaw occurs in the Program county of Palm Beach.

Program Assessment: The coastal dune habitat of the pawpaw will not be included in the Program area. Therefore, APHIS has determined that the Program will have no effect on the four-petal pawpaw.

Tiny Polygala (*Polygala smallii*)

Status: The tiny polygala was listed as endangered on July 18, 1985 (USDOI, FWS, 1985a).

Pertinent Species Information: The tiny polygala is a short-lived herb that grows to a height of 0.78 to 3.7 inches. It occurs in sand pockets in pine rocklands (sometimes in association with the deltoid spurge), open sand pine scrub, slash pine-high pine, and well-drained coastal spoil. It requires high light and open sand with little or no organic litter accumulation. Seedlings can be observed from late October through April with December through February being the times of greatest visibility. Flowering begins in

May and continues throughout the year. The plants show a marked reduction in their condition about 1 year after seedlings appear. The resources of the plant shift from growth and self-maintenance to flowering. The plants die at about 18 months. Pollination of the polygala has not been observed; self-pollination may occur since the tiny polygala has the structures for this. Ants have been observed taking the seeds of this polygala to their hills.

Threats to the polygala are habitat loss due to urban development, fire suppression, and exotic plant infestations (FWS, 1999).

According to the FWS, the tiny polygala occurs in the Program counties of Dade and Palm Beach.

Program Assessment: The habitat types of the polygala will not be part of the Program area. Therefore, APHIS has determined that the Program will have no effect on the tiny polygala.

Snakeroot (*Eryngium cuneifolium*)

Status: The snakeroot was listed as endangered on January 21, 1987 (USDOl, FWS, 1987a).

Pertinent Species Information: The snakeroot is an erect perennial herb that occurs in scrub habitat, in nearly barren sand, and usually with rosemary. It grows in sunny sites and readily colonizes bare sand created by fire and other disturbances. Budding occurs in July with flowering from August to October. Fruiting and seed dispersal take place from October to January. The snakeroot reproduces sexually and by seed. Pollination is most likely from generalist insects, which is what pollinates members of this family.

Threats to the snakeroot are habitat loss of the limited number of sites that meet the plant's requirements, fire suppression, and ORV's (FWS, 1999).

According to the FWS, the snakeroot occurs in the Program county of Collier.

Program Assessment: The scrub habitat of this plant will not be included in the Program area. Therefore, APHIS has determined that the Program will have no effect on the snakeroot.

Deltoid Spurge (*Chamaesyce* (= *Euphorbia*) *deltoidea* ssp. *deltoidea*)

Status: The deltoid spurge was listed as endangered on July 18, 1985 (USDOl, FWS, 1985a).

Pertinent Species Information: The deltoid spurge is a perennial herb that occurs in pine rocklands. It forms mats over exposed limestone and is often found growing in sand pockets in association with the tiny polygala. This spurge requires relatively high light levels and little to no organic litter accumulation. Periodic fires maintain the low litter and open canopy. Flowering occurs from April through November, with July as the peak month. The reproductive ecology of the genus is highly variable. Some members rely on insects for pollination and seed production, and others are self-pollinated. Pollinators may include bees, flies, ants, and wasps. Seed dispersal in the family (Euphorbiaceae) varies from some that are dispersed by explosive seed capsules to some that are dispersed by ants.

Threats come from habitat loss, poor management of publicly-owned sites, fire suppression, and invasion by exotic plants (FWS, 1999).

According to the FWS, the deltoid spurge occurs in the Program county of Dade.

Program Assessment: The habitat of the spurge will not be included in the Program area. Therefore, APHIS has determined that the Program will have no effect on the deltoid spurge.

Garber's Spurge (*Chamaesyce (=Euphorbia) garberi*)

Status: The Garber's spurge was listed as threatened on July 18, 1985 (USDOI, FWS, 1985a).

Pertinent Species Information: The Garber's spurge is a short-lived perennial herb that grows on thin sandy soils or limestone. The habitat types it occurs on are pine rocklands, coastal flats, coastal grasslands, and beach ridges. It can be found in areas that are open and sunny to moderately shaded (FWS, 1999). This spurge flowers and produces fruit from March to December (FWS, 1991). The reproductive ecology of the genus is highly variable. Some members rely on insects for pollination and seed production, and others are self-pollinated. Pollinators may include bees, flies, ants, and wasps. Seed dispersal in the family (Euphorbiaceae) varies from some that are dispersed by explosive seed capsules to some that are dispersed by ants. Threats to the spurge include habitat loss, invasion of the habitat by exotic plants, fragmented habitat, and small populations (FWS, 1999).

According to the FWS, the Garber's spurge occurs in the Program county of Dade.

Program Assessment: The habitat of the spurge will not be included in the Program area. Therefore, APHIS has determined that the Program will have no effect on the Garber's spurge.

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